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Climate Change and Heidegger's Philosophy of Science

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Ruth Irwin

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At this point in time, climate change is seen in very simplistic terms. Climate change has been captured by a 'debate' between scientists and economists. But this arrival of climate change in the public domain sheds little light on the *existential* of climate, to use a term by Heidegger, or to illuminate the ways that the finitude of climate conditions challenges *our* being.

At the Copenhagen summit on climate change, Cop 15, political contingencies warred with scientific data. The Cop 15 meeting failed to produce binding commitments on countries, 'developed' or 'undeveloped,' for limiting greenhouse gas emissions. However, politicians agreed to keep emissions low enough that additional warming of the mean global surface temperature does not go over 2°C higher than pre-industrial levels. Ten months earlier, pre-eminent climate scientists such as Jim Hanson and Stefan Rahmstorf were adamant that the 2°C increase in global temperature is too high. Hanson believes that 350 ppmv of CO₂ in the atmosphere is the densest that is safely possible. Any more produces the unstable climatic conditions that we are presently experiencing (Hansen, 2009). Rahmstorf told the Climate Change Congress in Copenhagen, March 2009, that the 2 degree threshold which is so commonly touted as the upper limit to 'safe' climate change actually presents a 50% likelihood of going over the 'tipping point' that could swing climate warming into a very unstable epoch that makes life unviable for most species, including humanity (Rahmstorf, 2009).

The time frame of tipping points is highly debatable. Some tipping points have already been reached; the oceans tipped from an exclusive carbon sink to a sometime carbon producer in the summer of 2004-5. Likewise, the Siberian permafrost has melted sufficiently that the underlying peat is rotting and emitting methane in the summer. These two significant changes in ecosystems are now contributing to the greenhouse effect in a vicious feedback loop. Combined with the continued expulsion of anthropogenic greenhouse gas emissions, the speed of climate change increases as more

of these feedback loops develop. When the ultimate tipping point from one epoch to another may happen is unclear. But it has a proximity that has never been so clear before.

The scientific discussion of risks and ecological stress factors is painful to contemplate. At the moment the calculations of 'risk' are fitted neatly into pre-existing insurance risk models, which manage to quantify and assess risk areas, and which subject the habitats and lives of millions of species to the reductive financial calculations of the market. This makes island states like Tuvalu expendable, as there are relatively few human beings living there, and since nonhuman indigenous species only 'count' as assets that might be compensated.

Yet this measure of 'risk' is not merely disturbing for its callousness about the lives and habitats of populations, of indeed, millions of people and billions of plants and animals. Climate change presents a more profound risk that the loss of specific ecosystems. As I describe in more detail elsewhere, in the Introduction to *Climate Change and Philosophy* (2009), there are discussions now at the Royal Society that our impact on the Earth System has grown so massive that it is literally epochal: because we are changing the face of the Earth, the Holocene epoch is coming to an end, and a new era, the so-called Anthropocene, is beginning. In the Earth's history, the Holocene was a rather stable and temperate era; the Anthropocene looks to be volatile and uncertain. And quite possibly it will be rather brief.

The Emissions Trading Schemes so central to the old Kyoto-inspired round of 'solutions' to climate change are based on models of risk assessments and scarcity. The idea is that the market's metaphysical 'balancing' mechanism will be put to work if erstwhile externalities in CO₂ equivalents are included in the cost-benefit equations. This means that pollution must be quantified and capped, and a market must be created for pollution allowances to be traded (see Irwin, chapters 3 & 4, 2008 and chapter 3, 2009).

The predominance of the market model is obvious in the debates raging at Copenhagen at the end of 2009. Poorer nations have emitted less than a third of the pollution currently filling our skies. If the dominant states, such as the USA, and Europe, who have already produced two thirds of the pollution, insist on mild to moderate emissions reductions, then they are effectively continuing to 'own' much more than their fair share of valuable pollution rights. One of the few positive spin-offs of this reductive econometric thinking is that it makes the gap between rich and poor visible. The mistake though, is to imagine that the market, metaphysical or not, has any interest in equity. Or that it is capable of fundamentally changing the relationship that humanity has with the natural environment.

Science

Science, technology, and economics are elements of the modern worldview. The modes of operations enacted by each of these elements contribute to the emergence of climate change. Heidegger argues that science is the 'culmination of metaphysics' and that technology epitomises the horizon of knowledge that shapes understanding within the modern worldview. I examine economics and the Emissions Trading Scheme in *Heidegger, Politics and Climate Change* (2008); here I will focus on the role of science and technology in the modern response to climate change. The question is if, and how, science, technology (and economics) in their present form contribute to climate change and whether any solution can emerge from within the same paradigm that is creating the problem. To examine this, it is necessary to step into the philosophical realm and enquire about the essence of science and technology in modernity.

The separation of subjective humanity from natural objects relies on a juxtaposition of the subject projecting concepts onto objects and integrating them into a worldview. Worldview and objects are not independent from one another. A Cartesian presumption is that subjective thinking deduces an object's reality and value through pure reason and universal truth. This presumption neglects the existential positioning of the object as a focus of knowledge.

Science and economics are not sufficient to understand the full impact of climate change. Science does little more than describe what can be ascertained about things as 'facts'. My involvement with the climate science conference in Copenhagen in March 2009, preparatory to COP 15, taught me about two features of current scientific thinking. Many of the younger researchers I met struck me as being almost entirely unreflective of the positivist methodology of their data gathering. Older scientists, by contrast, appeared to me more cautious about positivist hopes, and were more prepared to consider the possibility of a paradigm shift in the conceptualization of facts. The positivists believed that counting stressed and healthy trees in the Amazon basin would give them an accurate time snap of regional effects of climate change. Subsequent alterations of models would be provided by new data, say soil moisture levels, microbe counts, or water salinity. The models supposedly correlate directly with the Amazon. Lacking from such positivistic approaches are theories of representational mediation. Lacking is also an understanding that mechanisms of data gathering may affect the types of knowledge gathered. None of the scientists I met found talking with indigenous tribes at all interesting, and there is no intention of taking their insights into account. In many cases, the scientists gather the information second hand. They rely on meteorological data from distant governments departments, and correlate the information from hundreds of countries together into tidy graphs.

Positivism *expects* a logical formula that explains the matter of the Earth. Complexity is read as a set of complicated causal stimuli that needs to be included in the model. The

unknown and the uncertain are just the yet-to-be-discovered or better still, the yet-to-be-deduced.

Climate sceptics justify their position with a similar set of views. They assume a regular order to the universe, an underlying mathematical structure. So they embrace the same philosophy of science as that of the climatologists; both scientists and sceptics are positivists that value the use of mathematical formulae, and the analysis and selection of data into graphs that make large claims. The assumptions are that quantification and charts point towards a substratum that structures the universe. As evidenced by the hacked emails posted by East Anglia Gate (2009), the graphs are a narrative form and are intentionally shaped to convey a certain perspective or world view.

I am not suggesting here that climate sceptics have a case. Unfortunately, it is the prevalence of ignorance, scepticism, disbelief, and resistance to change in the greater population, and particularly within the corporate media, that has shaped the urgency for cohesion, indeed, the 'consensus' of the climatology message. The IPCC has overtly struggled for a cohesive agreement. But reality resists attempts of naming things in so clear and concise a manner as positivistic science suggests.

On both sides of the debate, evidence is perceived through the modern lens. At its best, this narrative relies on carefully constrained moral codes that make all data available to the public, and interpretation as transparent and open to criticism as possible. But all science is a narrative, not exactly a fiction (nor a 'construction'), but a method of ascertaining the truth from the appearance light of modernity.

The methodology used to gather data serves a selection process and shapes the data collected. This is common knowledge in the social sciences and time and again illustrated in the hard sciences.

But the consensus building that characterises the IPCC is not only a reaction to the dubiousness of climate change sceptics. It is also the norm amongst UN institutions that try to bring together disparate needs and views of cultural groups in nation states around the world. The method the United Nations uses is to draft documents and debate them amongst specialised interest groups, plucking out elements that will never be agreed upon, creating ungainly compromises that no-one is entirely happy with, and forging a forbidding document that is very precise in some areas, purposefully vague in others, very legalistic, and advocates a universal template (often neoliberal), which presumably can be made to 'fit' everywhere.

Heidegger and world view

Heidegger's philosophy is helpful for considering, at a deeper level, how science, technology, economics, and politics can respond to climate change. Yet Heidegger is

only a start. In a sense, he still regards humanity as the 'centre of the universe'. The problematic of climate change demonstrates how this conceit serves to bring about our own demise. In *Nietzsche* he writes “every representation of beings as a whole, every interpretation of the world, is inevitably anthropomorphic” (Heidegger, 1982, vol. II, p. 99). The key to Heidegger's philosophy, as he himself describes it, is the Question of Being.

Heidegger argues that any civilization has a finite duration; a 'birth' and a 'death'. Like a person's own life, contemplation on our emergence and culmination helps to contextualise the practical consequences of events in the everyday 'now' (see Heidegger, 1999 and Irwin, 2009: chapter 3). Seeing beyond our own epoch is difficult if not impossible. The world view shapes understanding of all events and artefacts within or without the historical boundaries of the epoch.

Human enquiry is privileged for Heidegger. It is the human ability to think that enables us, rather than other species, to reflect upon and bring Being out of mundane existence and into the light of knowledge (Heidegger, 1949). The question of Being positions the questioner in a crucial relation to the questioned. Thus, for Heidegger, while the Earth, the Moon, and the stars may have *existed* before human life evolved, it was irrelevant because there was no one there to perceive it.

Yet Heidegger's position, while anthropocentric, is not the solipsist Idealism advocated by Descartes, Berkeley, G.E. Moore and others.

Science, politics, economics, even the notion of the 'nation state' itself, are all rubrics of the modern world view. Science cannot be understood as isolated or independent of the world view in which it is situated. Science is characteristic of modernity. It is shaped and made possible by modernity. Heidegger argues that technology is the horizon of knowledge that makes modern science distinctive from its earlier forms (see Irwin, 2008 for discussion on Heidegger's technological *Gestell*). Technology offers us the illusion of mastery, while insisting that every possibility is co-opted into the machinery of constant production and consumption. Technology is the horizon, or *Gestell*, but science itself has a special relation to the modern world view. Science is grounded in metaphysics. More than a simple aspect of modernity, science is, according to Heidegger's 1938 essay, “The Age of the World Picture”, the 'essence' of modernity (Heidegger, 1977, see also Glazebrook, 2000).

Trish Glazebrook's *Heidegger's Philosophy of Science* (2000) positions science as the 'essence' of modernity in Heidegger's work. As Glazebrook acknowledges, Heidegger more often refers to the technological than the scientific. Technology enframes our world view but, she argues, it is the scientific that is the 'essence' of modernity. “For Heidegger, science is not just one phenomenon among several: it is the determination of the metaphysics of modernity” (Glazebrook, 2000: 208).

The characteristics of science that make it 'essential' to modernity have nothing to do with the methodology of positivism. Rather, the way science is 'essential' is more akin to Kuhn's concept of the paradigm, or Karl Popper's work on the *limitations* of the positivist enterprise. Science is 'essential' in serving as a site where the 'thing in itself' and its conception stand in close proximity. At that site, this relationship is often problematized, and the unknowable can be most apparent. At its best, science makes human perception stretch to its utmost.

But most science is not at its best. Most science accumulates 'facts' that reinforce the worldview of the things in a way that is already at hand. Thus, vast quantities of data can reinforce an existing conceptual apparatus and get no closer to understanding how that paradigm limits understanding in crucial, if subtle ways.

Yet facts that suggest anomalies to the norms of the conceptual system provide hints that a better conceptual framework is necessary. There is always a tension between evidence and explanation. Not only does the evidence, or the appearance of things, often contradict our projected conceptual frameworks, but our method of gathering of data also creates a particular response pattern. If, for example, we gather ice in the Antarctic with a shovel, our method would be too messy to determine how long ago the ice was laid down. By careful drilling for a long continuous core, and by setting up an equally careful storage, scientists can count annual rings in the ice. The individual ice strata disclose weather information about specific years. Technology makes such fine-grained knowledge possible.

But as technology shapes what is knowable, it marginalizes other conceptual paradigms, alienating them from the 'facts' about the objects. Snow and ice in the Arctic are possibly quite different from snow and ice in the Antarctic. Does Miss Smilla's feeling for snow help our approach to climate change?¹ I think it does, in ways quite different from the Siple Ice Station core samples (Neftel et al, 1997). Miss Smilla's feeling is visceral and immediate. It has a history of a different kind; an upbringing amongst Inuit, a real time experience of blizzards and snow drifts, of soft falls and hard wind compaction, of wet mushy snow, of summer melts, and quick autumn freezes. Miss Smilla's conceptual apparatus is figured by genealogy, stories and personal experience. The technological interface is still present but it is as much about types of clothing, holes in worn gloves, traditional kayaks and mechanised snow mobiles, modern and traditional in a complex interweave. The complexity of her experiences, both direct and embedded in the cultural narratives of Greenland and Denmark, inform the countless names for snow (Hoeg, 1993). Actually, the scientists examining the Siple ice cores are aware that the layers of snow sediment also vary in complex ways that are

¹ *Smilla's Sense of Snow*, a 1992 novel by Peter Hoeg, and made into a movie 1997, is a story about a half-Inuit, half-Danish woman raised in Greenland and living in Denmark.—M.S.

not easily explained with a limited repertoire of language. Seasonal variations are an important element of the core samples, providing a time line. Scientists examine the molecular make up of the gases that have lain down over years within the cores. This is the crucial aspect of the comparative science and contextualises modern day CO2 emissions. Does wet ice trap more or less air? Is blizzard ice more likely to whip high altitude air into the mix than gentle snow? Does it hail in the Antarctic? Miss Smilla might offer insight.

History of Ideas

Heidegger remains caught up in the problematic posited by Plato. When considering the problem of the modern alienation from the tempo of the seasons, Heidegger casts back to the earlier version of the modern world view. What he tries to do is extract philosophy from the dualism Plato conceptualises between the Worlds of Appearance and Ideas. Instead of the dualism between Appearance and Idea, Heidegger looks to pre-Socratic Greek thinking, especially Heraclitus and Parmenides (Heidegger, 1973a).

Having an understanding of Being (i.e. being the opening in which beings can show up) is humanity's most essential trait. The essence is that which endures. The essence of humanity is attentiveness to the endurance of Being as it 'holds sway' in the growth and decay in particular beings (Heidegger, 1973a).

Although Heidegger is pained by the Idealist solipsism that developed after Plato's allegory of the Cave, he believes that this view of being, like Pandora's box once opened, cannot be closed off again (Heidegger, 1973b). Plato wrote that the real or essential truth is too bright to look at, just as we cannot look directly at the sun. Instead, we apprehend shadows or appearances of the truth of the Idea. The shadows are a representation of the real. They fail to signify the full scale of the brilliance of the essential Idea, but a poor copy is all that mere humans are capable of comprehending. Thus, Plato has a very particular view of two key concepts, essence and appearance that form a dualism. This system both constrains and elevates human capacity. Human apprehension of the appearance or representation of the Idea is crucial (though presumably all sorts of animals, reptiles, insects, and so forth could have cognizance of shadows). The essence of the idea is static, universal, and beyond the limitations of historical time and place. Plato creates a harsh separation between the World of Appearance and the World of Ideas.

There is a medieval distinction between *existentia* from *essentia*, or *thatness* from *whatness*. Plato made a double move with the solipsist view of the appearance that could only represent the essence of the Idea. *Whatness* became a fixed categorisation. The *existentia* residing in *thatness* disappears from view.

In *Basic Problems of Phenomenology*, Glazebrook draws attention to Heidegger's attempt to discover how essence and *essentia* (or thatness and whatness) had arisen from an earlier understanding. In this way, Heidegger manages to resituate the meanings of *essentia* so that the pre-Socratic refers to the “productive comportment toward beings” (BPP 110/ GP 155 in Glazebrook, 2000: 211) and the Platonic comprehension of *essentia* as “pure beholding is fixed as the proper access to a being in its being-in-itself” (BPP 110/ GP 155 in *ibidem*: 211).

Plato instigates a new world view, which separates truth invested in beings, and situates it instead in the Idea. The Idea is universal and beyond historical bounds of time and place. Likewise, Plato resituated *physis* or nature to the universal, from earlier concepts of *physis* as the natural becoming and emerging (Heraclitus), or enduring, preserving existence or Being (Parmenides) (Heidegger, 1973a).

According to Plato, the Real (or Ideal) is fixed regardless of the ravages of time, whereas appearance is a semblance, it is deceptive, unstable, temporal, emerging and vanishing again. However, Heidegger thinks about the appearance (or evidence of things) with much higher regard. Heidegger draws out three aspects of appearance which are based on the ‘shining’ forth of Being. The German term for appearance is *Schein*, and it has an interpretive range, firstly as ‘radiance’ or glow, secondly as ‘appearing’ or coming to light, and thirdly, as ‘mere appearance’ or semblance. At one end of the range, appearance divulges Being by letting it radiate from beings. At the other end, the variation of the subjective view of the appearance of the being is (in Platonic terms), a deviation, a copy, or even an illusion of Being. Heidegger argues that the shining forth of Being has to be ‘wrested’ from Being, by refusing to accept a view as scientific (or mathematical) correctitude. Heidegger admonishes us to ignore “subjective,” “objective,” “realistic,” idealistic” as the mode of questioning Being. ‘*Schein*’ in its fulcrum as coming to light, both of the radiance of Being and the semblance of Being, includes the ‘real’ and the fictional as ranges of truth. Perceiving what shines forth as appearance offers the opportunity for Being to be apprehended by humans through beings. Thus, appearing is the means by which Being emerges from unconcealment. Unlike Plato, who had put Being beyond time and space, Heidegger argues that “Appearing is the very essence of Being” (Heidegger, 1973a: 101).

Human subjectivity apprehends the truth of Being through both manifest appearance and the persistence of beings in cycles of emergence and decay—the ‘enduring sway of becoming,’ as Heidegger puts it. For him, humanity partakes in the unconcealed radiance of the Being as manifested in particular beings. Heidegger is highly critical of Plato's divestment of Being from particular beings, a divestment he regards as the beginning of the nihilism of metaphysics.

Plato emphasized the mimesis of the appearance, which implies that (specific) being is a replica and (essential) Being the original. The permanence of Being is juxtaposed

against the temporal limits of beings. The Idea is in opposition to the illusion, the deficiency of appearance. Being shifts to a model that transcends the mere apprehension of transient objects. The theory of apprehension changes - "it becomes a correctness of vision, of apprehension as representation." The appearance is the semblance of Being, which thinking can 'correctly' ascertain.

'Becoming' also changes from the viewpoint of *logos* (narrative, taking account, being rational). It is no longer the enduring presence that occupied a place, but is instead the calculable magnitude and movement of space and time. Becoming shifts its emphasis from enduring sway to movement. As movement, or speed, becoming has velocity that is calculable as distance divided by time.

Heidegger argues that before Plato, Parmenides thought of Being as *a priori* both appearance and becoming. But since Being has lost its 'ground' in beings, it is susceptible to Plato's transcending it towards 'the good'. Values impose an 'ought' upon Being, and so it no longer intrinsically 'is' in radiant disclosure through beings. Heidegger argues that the usurpation of Being by values is the start of nihilism. Here the human imprint takes over Being; there is no longer a reciprocal relationship where thinking both 'is' and at the same time apprehends Being. The staleness of *logos* replicates representations rather than wrest Being originally and forcefully from beings. Philosophy is captured by the logic of values and statements.

Being, *techne*, and society

The long explanation of the steps of Heidegger's reworking of philosophy from the *logos* of metaphysics to ontology helps to see how and why he developed his own conception of the nominal gap. It also helps to see how and why he framed the relation of the essence of technology with Being, given the modern horizon of technology. He was scathing of the philosophical division of individual subjects from natural objects (Heidegger, 1973a; Irwin 2009, see also Plumwood, 1983).

In *Being and Time* (1927) equipments form the work-world we are all born into. Equipment surrounds us from our earliest years. We learn how to *use* a chair before we can *name* it 'chair'. Heidegger argues that this unconsidered, unconscious mode of living is the predominant mode of being-in-the-world. Human beings are 'thrown' into an 'always already' existent world. To collapse the dualism between subjects and objects Heidegger developed several techniques.

But just what is the relationship between Being and technology? We have seen that Heidegger tried to disrupt Plato's categorization of Being as an essential Idea and the appearance as an inadequate representation shadowing the original. Heidegger's philosophy is 'essentially' materialist. Following Nietzsche on the one hand, and a

Hegelian, Marxist genealogy of ideas on the other, Heidegger rejects the otherworldliness of universal Idealism, the Idea, and the transcendental Being.

Technology plays an important part in the development of the modern Social Contract. Hobbes, Locke, and later Marx all consider the role of altering and 'improving' found objects into tools as crucial to the basis of society. To turn plums into jam is a technological modification that alters the foodstuff by preserving it. This enhanced commodity can be bartered. Natural found objects, according to Hobbes, are part of the inalienable rights that pertain to the State of Nature and that grow later into rights under the Social Contract. It is the combination of natural object (*physis*) and the efforts and techniques of the artisan that can transform natural properties in multiple senses. The transformed properties enable storage, facilitate technological lifestyles, and enable the privatisation of ownership from the commons to the individual. Thence they are the basis of modern economics.

Perhaps echoing the alienation of the representation or mimesis that Plato posits as appearance, Marx bemoans that the technological enhancement of found objects and their bartering are the first examples of alienation from the means of production. In his text on "Estranged Labour" in the *1844 Manuscripts*, he argues that technology ultimately makes individuals alienate from the human 'species-being'.

In estranging from man (1) nature, and (2) himself, his own active functions, his life activity, estranged labor estranges the *species* from man. It changes for him the *life of the species* into a means of individual life. First it estranges the life of the species and individual life, and secondly it makes individual life in its abstract form the purpose of the life of the species, likewise in its abstract and estranged form (Marx, 1964).

In the *1844 Manuscripts*, Marx says "Private property is therefore the product, result, and necessary consequence of alienated labour, of the external relation of the worker to nature and to himself" (ibid.: 9). He goes on to note:

This fact simply means that the object that labour produces, its product, stands opposed to it as *something alien*, as a power independent of the producer. The product of labour is labour embodied and made material in an object, it is the *objectification* of labour. The realization of labour is its objectification. In the sphere of political economy, this realization of labour appears as a *loss of reality* for the worker, objectification as loss of and bondage to the object, and appropriation as estrangement, as *alienation* (Marx, 1964).

Heidegger does not go so far as discussing alienation as private property, as Marx does in his later text *On Capitalism*. But similar to Marx, Heidegger's work concerns the

relationship between technology and Being. Glazebrook traces shifts in emphasis in Heidegger's repeated engagements with this relationship.

In a move that foreshadows his 1940 reading of Aristotle's *Physics*, Heidegger suggests that production always makes use of material which is already there. In the 1940 account he takes that to mean that *physis* is prior to *techne*, since the latter must always appropriate its material from the former. Here in 1927, however, he suggests that it is only through productive comportment that the understanding of being as that which is already extant is possible. Productive comportment, then, determines some things as what they are, and gives access to the fact that something exists already which can be made into something else. (Glazebrook, 2000: 211-212).

That is, the world view reaches for a certain interpretation of things. Things only emerge from the background and register if they slot into the expectations defined by the world view. In short, *techne* allows Being to 'show forth', to use Heidegger's terminology. In *Being and Time* Heidegger tries to disintegrate the solipsist division operating in Idealist philosophy between subjects and objects, or humanity and *physis* or Being. He does this by showing how equipment 'worlds', contributing to self-understanding of each of us in a largely unconsidered way. Long before we can reflect with language (re-presenting things with names, shadowing the being of beings with words) we are shaped into technologically savvy people.

By 1954, when "A Question Concerning Technology" appeared, Heidegger took the conception of a technological world in a more cynical way. He now argued that equipment does not just surround us in a relatively benign manner. It forges our subjectivity. We are under the illusion that we are 'in control' of technology and by extension, in control of nature. But this assumption is actually a result of the metaphysical world view of modernity that has alienated us from nature, making us forget the question of Being and forget what makes us meaningful.

Heidegger shows how every element of nature and humanity becomes integrated into a framework of modern utility. Whereas once the river might symbolise a boundary between one principality and another, or afford a good fishing spot, or a restful place to contemplate, the river has become something different within the new horizon of technology. The technological *Gestell* requires the river to produce some element for consumption in the machinery of production. Thus, the river serves a hydro-dam, or links one population to another, or it is sold as a 'tourist spot'. All of these functions of the river co-opt it into ongoing (or potential) utilitarian value. Heidegger argues that the technological *Gestell* challenges forth Being in an abrupt and inconsiderate manner. In earlier times, the waterwheel let the river flow at its own pace. In our times, the hydro power station is part of a more invasive shaping of the river; the power station is at a

dam; and the river flow discharged from the resulting pool is regulated at a pace dictated by human needs, not by seasonal flow volume.

Earlier understandings of the river might have been somewhat utilitarian, too, but with a qualitative difference. In feudal times the river may have been diverted for a mill. The mill did not work all the time, it was in operation when the harvest came in, and when the river was full enough to drive the water wheel. Storage of ground wheat was limited, and the locals supplied by the mill were heavily reliant on the vagaries of each season.

Modern understandings of the river reduce it to utilitarian considerations. Storage capacity has changed completely. Electricity makes the mill operate year round. The mill no longer needs proximity to the river as electricity is networked far and wide. Intermodal transport allows grain from around the world to be ground; seasonal shifts have become irrelevant. Flour is consistently available regardless of season, to a widely distributed set of 'consumers.' There are obvious benefits to the economic distribution of goods. Storage and transportation have allowed locals to be free of the constraints of their own ecosystems.

Yet this 'freedom' of local people from constraints of their own ecologies also means they are less cognizant of threats to their ecosystems by mass production. Huge swathes of the planet are profoundly compromised by industrial practices; industrial agriculture, mining, mass deforestation, urban sprawl, and so on. The technological *Gestell* alienates us from our niche, and ultimately, as Marx noted, from our species-being. Threat of ecological destruction has long been a problem, but the alienation afforded by industrial production has allowed most of us to ignore the problematic and reside smugly within the illusion of mastery over nature.

Climate change, however, is on a scale that disallows this pervasive ignorance. It is a planetary event of a size that overwhelms even giant entities such as nation states and multinational companies. Saudi Arabia and other OPEC states may try hard to discredit climate change as a problem, but ever since 1988 the UN attempts to administer a co-ordinated global response to climate warming. Already the creation of a transnational institution such as the Intergovernmental Panel on Climate Change indicates the seriousness of the problem.

Climate change is challenging the anthropocentric position of Heidegger (and that of extreme Idealism) for its hubris. Scientists seeking to demonstrate the anthropogenic causes of modern climate change have sought to understand the climate of the earth over the last 650,000 years. Thus, our understanding has extended well beyond the epoch of actual human civilization. It will always be the case that we inevitably project our concerns and world view onto data. But pressing at the limits of knowledge, the evidence challenges our knowledge systems and extends or obliterates previous ways of

conceptualizing things. Climate change brings modernity as an epoch into clear view, from its beginning to its end. The fossil-based industrialization and consumption are proving to be so toxic that as a *modus operandii* they have to change fundamentally. Heidegger asks questions of the modern paradigm that may allow us to transcend the technological alienation that industrial production and modern philosophy, as its cultural superstructure, have created. Climate change is setting a limit on that world view with a finality that has never before been encountered. It remains to be seen whether thinking of a more ecologically based mode of technology will sufficiently change humankind.

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